# A. PROJECT MANAGEMENT

## A.1. *Title and Approval Sheet*

# A. CRUISE SHIP WASTEWATER MONITORING
# SOUTHEAST ALASKA
# 2000

# QUALITY ASSURANCE PROJECT PLAN

APPROVALS:

John Hansen
President, NWCA

Signature Date

David Eley
Cape Decision International Services
Project Manager

Signature Date

Michelle Bonnet
Bonnet Technical
Quality Assurance Officer

Signature Date

Randolph Bayliss
Smith Bayliss LeResche, Inc.
Sampling Manager

Signature Date

David Wetzel
Laboratory Manager
Analysis

Signature Date

Reviewed by:

LCDR Spence Wood, US Coast Guard

Signature Date

Deena Henkins, Alaska Department of Environmental Conservation

Signature Date

## A.2. *Table of Contents and Document Control Format*

### A.2.a. Table of Contents

## A.2.b. List of Figures



## A.2.c. List of Tables



## A.2.d. Acronyms/Abbreviations Used

| | |
|---|---|
| ADEC | Alaska Department of Environmental Conservation |
| BNA | Base/Neutrals, Acids |
| BOD | Biochemical Oxygen Demand – 5 day test |
| CFR | Code of Federal Regulations |
| COD | Chemical Oxygen Demand |
| DQO | Data Quality Objective |
| EPA | Environmental Protection Agency |
| HDPE | High Density Polyethylene |
| HCl | Hydrochloric Acid |
| $H_2SO_4$ | Sulfuric Acid |
| $HNO_3$ | Nitric Acid |
| MDL | Method Detection Limit |
| MSD | Marine Sanitation Device |
| NaOH | Sodium Hydroxide |
| %R | Percent Recovery |
| QA | Quality Assurance |
| QAPP | Quality Assurance Project Plan |
| QC | Quality Control |
| RPD | Relative Percent Difference |
| SM | Standard Methods |
| SW-846 | Solid Waste Methods |
| TSS | Total Suspended Solids |
| USCG | U.S. Coast Guard |
| VOCs | Volatile Organic Chemicals |

### A.2.e. Document Control Format

The document control format will consist of the following:

Revision Number __
Revision Date: _____

This document control information will appear in the upper right corner of each page of the Quality Assurance Project Plan. Each revision of the QAPP will be assigned a revision number obtained by adding 1 (one) to the previous revision number.

On the bottom of each page will be found:

Cruise Ship Wastewater Monitoring # Quality Assurance Project Plan

## A.3. *Distribution List*

A copy of each revision will be distributed to the following individuals:

| **Individual** | **Organization** |
|---|---|
| David Eley | Cape Decision International Services |
| Randolph Bayliss | Smith Bayliss LeResche, Inc. |
| Amy Randolph | Smith Bayliss LeResche, Inc. |
| Caroline Hudson Morehouse | Smith Bayliss LeResche, Inc. |
| David Wetzel | Analytical Laboratories |
| Michelle Bonnet | Bonnet Technical |
| Deena Henkins | Alaska Department of Environmental Conservation |
| Lt. Commander Wood | U.S. Coast Guard |
| Steve Torok | U.S. Environmental Protection Agency |
| John Hansen | NWCA |
| Nancy Wheatley | Royal Caribbean Cruises, Ltd. |
| Randy Peterson | Holland America |
| Elaine Heldewier | Carnival Cruise Line |
| George Wright | Princess Cruises |
| Amy Crook | Center for Science in Public Participation |
| Gershon Cohen | Earth Island Institute |

## A.4. *Project Organization*

The organization for the Cruise Ship Wastewater Monitoring – 2000 project is as shown in Figure 1, below:

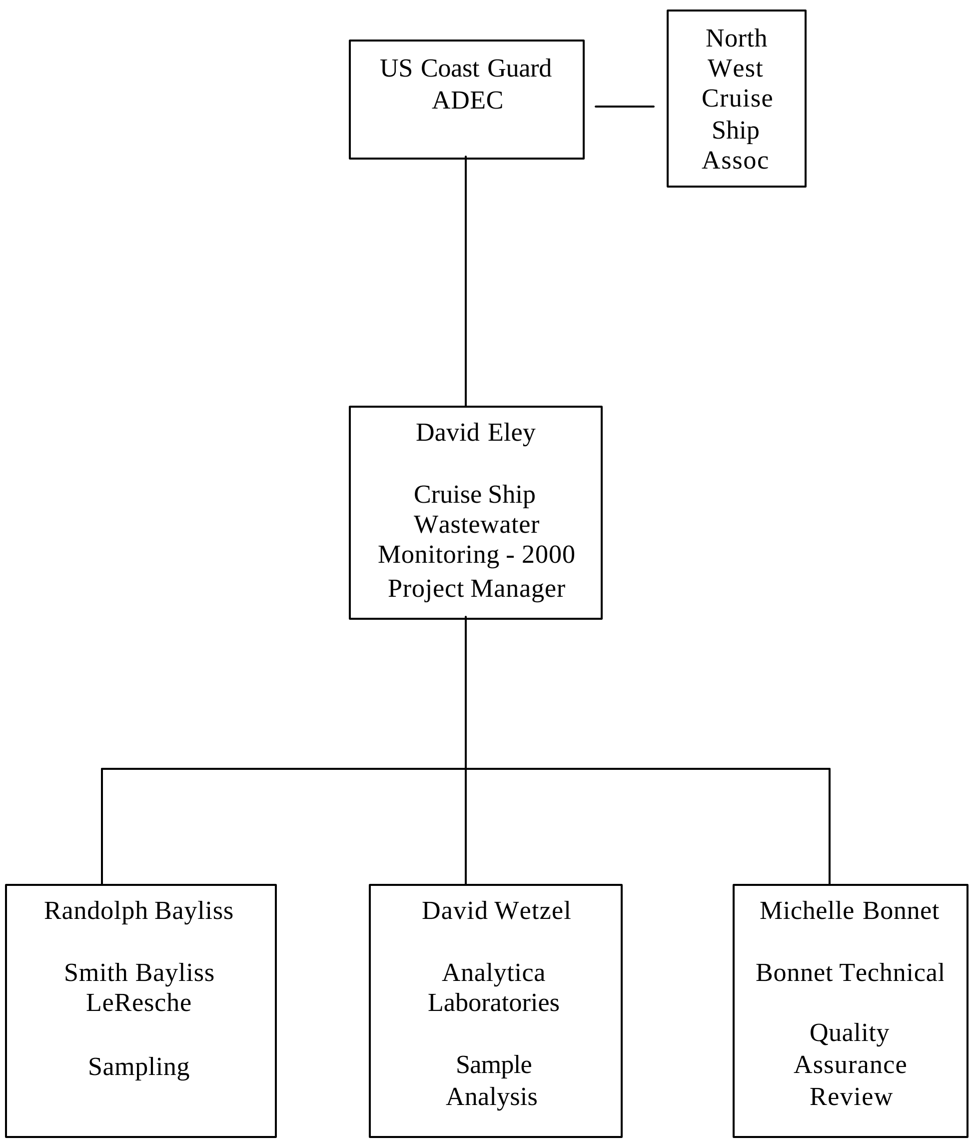


**Figure 1**
**Organization Chart**

**North West CruiseShip Association**
North West CruiseShip Association (NWCA) represents the cruise line companies undergoing wastewater testing during the summer of 2000. NWCA members are funding the sampling and analysis program.

**David Eley, Project Manager**
The Project Manager is responsible for ensuring that individual project components are executed in a timely and appropriate fashion. Responsibilities include:
- Ensuring that coordination among participating vessels and cruise line companies, project staff, and federal and state agencies occurs.
- Communicating project information to the Coast Guard, ADEC, EPA, and cruise lines.
- Assuring that project participants have necessary training.
- Fielding questions and requests for information that arise during and after the project.
- Managing the financial aspect of the project, including the determination of billing and payment mechanisms.

**Randolph Bayliss, Sampling**
Sampling is coordinated and conducted by employees of Smith Bayliss LeResche, Inc. Pre-sampling visits are conducted on each vessel and sampling plans are completed prior to sampling. A sampling schedule is designed and kept confidential; vessel operators are not aware of the timing of sample collection. Samplers are responsible for sample collection, sample integrity and custody, field measurements, and accurate notes. A compilation of field notes is provided to the Project Manager upon completion of all sampling.

**David Wetzel, Analysis**
Analytica Laboratories conduct all sample analysis according to their individual laboratory Quality Assurance Plans, and using EPA-approved analytical methods. If a sub-contract laboratory is used to meet holding times, that sub-contract laboratory adheres to Analytica Laboratories' quality control procedures.

**Michelle Bonnet, Quality Assurance Review**
The Quality Assurance Officer develops the Quality Assurance Project Plan (QAPP; this document) which defines the data quality expected of the project, and which describes assessment procedures for determining whether the data quality objectives have been met. The Quality Assurance Officer conducts a final review of the data upon completion of all sampling and analysis, and assembles a tabular report of data problems or qualifiers.

**Steve Merritt, Laboratory Quality Assurance**
The laboratory Quality Assurance Officer ensures that Analytica Group Laboratories' quality assurance program guidelines are followed, by reviewing laboratory contracts and performing technical data oversight. The lab QA Officer works closely with the laboratory manager and staff to ensure that the laboratory adheres to contractual

requirements. Mr. Merritt has over fifteen years experience in the environmental testing business and has been with Analytica since 1990.

**Deena Henkins, Alaska Department of Environmental Conservation**
The Alaska Department of Environmental Conservation (ADEC) representative will review the QAPP to determine if it meets the State of Alaska's objectives for the data collection effort. The ADEC representative will also review data as it is generated and determine whether regulatory action is required.

**Lieutenant Commander Wood, U.S. Coast Guard**
The U.S. Coast Guard (USCG) representative, in close consultation with ADEC and North West CruiseShip Association, will provide agency oversight for all sampling and analysis efforts during the 2000 cruise ship season. The Coast Guard will review the QAPP and sampling schedules, to determine if they meet the Coast Guard's objectives for the data collection effort. The USCG representative will also review data as it is generated and determine whether regulatory action is required.

## A.5. *Problem Definition/Background*

As stated in the executive summary of the May 10, 2000 draft "Alaska Cruise Ship Initiative: Report of the Work Groups," Alaskans are concerned about potential impacts of the cruise ship industry on Alaskan coastal waters. This sampling and analysis program is designed to begin to address that concern by providing some baseline water quality information for graywater and treated blackwater discharges from the 22 large cruise ships being sampled during the program. Cruise ships discharge graywater (from laundry, showers, dishwashers), and treated blackwater (from toilets and urinals, and medical wastes) into the waters of Southeast Alaska. For the summer 2000 cruise ship season, by voluntary agreement, each cruise ship will discharge graywater and treated blackwater only when 10 nautical miles on a track line from its last or next port of call on its itinerary. In port, graywater and treated blacked water may be stored in dedicated ballast water holding tanks.

While standards found in 33 CFR 159 and 40 CFR 140 define concentration limits of certain pollutants (fecal coliform and total suspended solids) in treated blackwater discharges, routine monitoring of cruise ship discharges is not required by regulation.

**Applicable standards for blackwater discharges per 33 CFR 159 and 40 CFR 140:**

| | |
|---|---|
| Total Suspended Solids | < 150 mg/l |
| Fecal Coliform | < 200/100 ml |

## A.6. *Project/Task Description and Schedule*

The reference document for this project is the May 25 *Cruise Ship Wastewater Protocol for 2000 In Southeast Alaska.* Each ship will be sampled twice during the 2000 season. Sampling will begin in early July and will continue throughout the remainder of the cruise ship season in Southeast Alaska. Samples will be collected from each discharge port and will be analyzed for the following parameters:

Conventional pollutants (two sampling events):
- Total Suspended Solids (TSS)
- Biochemical Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD) (graywater and ballast holding tank only)
- Ammonia – Total
- Fecal Coliforms
- pH
- Residual Chlorine

Priority Pollutants (one sampling event, one composite sample for graywater, one composite sample for treated blackwater):

- Base/Neutrals, Acids
- Pesticides
- PCBs
- Volatile Organic Chemicals (VOCs)
- Trace Metals
- Cyanide

During one of the sampling events one sample will be collected that is a composite sample of all overboard discharge ports for graywater. A similar composite sample will be taken for treated blackwater. Only one composite sample will be required if graywater and treated blackwater are commingled before discharge. The composite sample(s) will be analyzed for conventional pollutants and priority pollutants.

The composite samples will be composited on board ship by the sampling staff, with the composite aliquots proportional to the discharge volumes. The details of the method of compositing will be described in the individual ship sampling plans.

Sampling will be a combination of grab and composite samples, even during a "compositing" sampling event such as priority pollutant sampling. Factors affecting the type of sampling include nature of the intended analysis (e.g., compositing is not appropriate for some samples, such as VOCs and fecal coliforms, among others), the configuration of the vessel and location of sampling ports, and the nature of the holding tank/system for a given type of sample. An example of the last factor would be a ballast water tank into which graywater and blackwater have been pumped while a ship is in port. Because of the possibility that settling and clarification might occur during the holding period, compositing over the pumping period will be done on this type of sample for both the conventional and priority pollutants. Table I in Section B.2 of this QAPP includes more detailed information on the types of sampling to be conducted, and the ship-specific sampling plans will detail more precisely for each vessel the sampling to be conducted.

Sampling will be conducted randomly. Sampling visits will be unannounced.

Four blind duplicates will be collected during the length of the project. Two of the blind duplicates will be for priority pollutants, and all four will be for the conventional pollutants.

The purpose of the blind duplicates is to assess sampling and laboratory error. Precision between the sample and its duplicate will be determined by calculating the relative percent difference between the two samples, in the same way that precision is measured between two laboratory-fortified blanks or a matrix spike/matrix spike duplicate. The use of duplicate samples extends the test of precision to the sampling method itself. The use of blind samples provides a test of the laboratory and is an attempt to check for possible bias or analytical errors not detected by the laboratory (e.g., a false positive). The samples will be analyzed by the same lab and for the same parameters.

## A.7. *Quality Objectives and Criteria for Measurement Data*

Data Quality Objectives (DQOs) are quantitative and qualitative objectives that define usable data for meeting the requirements of this project. DQOs define the quality of services provided by the laboratory and are used in the quality assurance review of the field and laboratory data. Review of the quality control (QC) data against the DQOs determines if the data are fully usable, considered estimates, or rejected as unusable.

### Quantitative DQOs

The quantitative DQOs for the Cruise Ship Wastewater Monitoring project include reporting limits, precision, accuracy, and completeness.

**Reporting Limits.** Reporting limits are determined by laboratory-provided or method-specified minimum levels, or by interim minimum levels where reporting limits at or near water quality criteria are not obtainable.

**Precision.** Precision is the ability to replicate the measurement. It is expressed as Relative Percent Difference (RPD). Acceptance criteria for RPD are analysis-specific and are defined by the laboratories. RPD is normally determined by matrix spike duplicates or by laboratory-fortified blank duplicates. The calculation for RPD is: $((X_1 – X_2) / ((X_1 + X_2)/2))*100$, and is expressed as a percent. $X_1$ = first sample measurement and $X_2$ = second sample measurement.

**Accuracy.** Accuracy is the closeness of the measurement to the true level of the variable. Accuracy is expressed as percent recovery (%R). Acceptance criteria for %R vary depending on the method. %R is normally determined by the use of known traceable laboratory control standards.

**Completeness.** Completeness is a measure of how many planned measurements for each constituent actually resulted in usable data. It is expressed as a percentage of the total number of samples collected. The completeness criterion for this project is 80 percent.

Because of the variety of vessels and discharges sampled, and the possibility for weather or other shipping-related delays resulting in missed holding times, a completeness criterion of less than 100% is reasonable.

**Qualitative DQOs**

The qualitative DQOs are representativeness and comparability.

**Representativeness.** Representativeness is a measure of how well the sample represents the environmental condition. Representativeness is addressed in this QAPP and the individual sampling plans by the pre-sampling inspections, sampling design, sample collection methods, choices of grab versus composite sampling, and sample handling. Representativeness will also be addressed by estimates of volume made and recorded in field notes taken at time of sample collection.

**Comparability.** Comparability is a measure of how well data from different sources can be compared to each other. It is addressed in the plan by ensuring that appropriate reporting limits are used and the data are of known and acceptable quality obtained through the use of specified QC measures and QA data review.

Because of the different source types found on different vessels (e.g., ballast holding tank on some ships containing both blackwater and graywater, while on others only containing graywater), careful definition of discharge types will be made in the sampling plans. It is essential that these definitions are carried through to the end data user, as these differences could erroneously bias date interpretation.

## A.8. *Special Training Requirements/Certification*

Samplers will be trained in sampling methods, sample handling, chain of custody, and field measurements. Additionally, samplers will receive appropriate training through their employer or their employer's designee, in any necessary shipboard safety procedures.

Laboratories used will have Alaska Department of Environmental Conservation Drinking Water certification, currently the only laboratory certification available in Alaska. Laboratory analysts will be trained in accordance with each laboratory's QA Plan.

## A.9. *Documentation and Records*

### A.9.a. Sample schedule and Vessel/Sample Identification

Smith Bayliss LeResche will develop a schedule of sampling. This master list will contain blind identifiers for the vessels, identifying vessels as "Ship A," "Ship B," as specified in the May 25 Cruise Ship Wastewater Monitoring Protocol. The Samplers will retain one copy of the sampling schedule, one copy will be provided to the Project Manager, one copy to the U.S. Coast Guard, and one copy to the Quality Assurance Officer. A copy will also be provided to the laboratory manager strictly for billing purposes; vessel names will not be included on any data reports generated by the lab. The sampling schedule will be maintained by all parties as a confidential document.

The laboratory will receive an additional copy of the sampling schedule without the vessel names but with the blind identifiers, to aid in lab planning and analysis scheduling.

Samples will be identified clearly on the chain of custody and sample bottles. For example, a sample from the Laundry Graywater from Ship L will be identified as "Ship L Laundry Graywater," with associated dates and times. In other words, the blind coding used for the ships will not be extended to the samples.

### A.9.b. Field Records

Field notes will be collected in bound field notebooks with numbered pages. On-board staff will witness the sampling and will initial the field notes. Included in the field notes for each sample are:

- Vessel name and blind identifier (e.g., *Hypothetica*, "Ship M")
- Sampling personnel,
- Shipboard assistants,
- Photos of sample ports,
- Sample date and times,
- Field measurements: pH and chlorine residual, temperature
- Samples collected
- Nature of sample: Composite or Grab
- Compositing Period
- Composite components
- Deviations from Sampling Plan and/or QAPP
- Unusual conditions

### A.9.c. Field Calibration Records

A field calibration log will be maintained with records of daily pH calibration checks for each sampling day field pH measurements are made.

### A.9.d. Laboratory Records

Upon completion of laboratory analysis and laboratory data review, the analytical laboratory will issue a full laboratory report describing the results of analysis for each sample submitted. Prior to issuance of the analytical report to the project participants (see Section B.8), the laboratory's QA manager will review and approve the report.

Components of the analytical report include:

- Sample information: blind ship identifier, sample names, date and time collected.
- Parameter name and method reference.
- Analytical result.
- Reporting Limit.
- Date of sample preparation and date of analysis.
- Quality control information: blank results, spiked blank or laboratory control standard recovery, matrix spike/spike duplicate recoveries, relative percent differences between duplicate spike analyses.
- Chain of custody.

- Documentation of deviations from methods, procedural problems with sample analysis, holding time exceedances, and any additional information that is necessary for describing the sample.

### A.9.e. Chain of Custody

The original chain of custody form will accompany the sample to the laboratory. When portions of the sample are sent to Analytica's laboratory in Colorado (e.g., for many of the priority pollutants), a copy of the chain of custody will be made and this will accompany the samples. At each transfer of the sample, the transfer will be indicated on the chain of custody form.

The original chain of custody will be included with the final report.

# B. MEASUREMENT/DATA ACQUISITION

## B.1. *Sampling Process Design (Experimental Design)*

Because each cruise ship has different wastewater management systems, each of the 22 ships will be visited prior to the first sampling event. A sampling plan will be developed by Smith Bayliss LeResche for each ship based upon detailed information provided by the cruise ship companies, and information gained during the visit to the vessel. The plan will include the following:

- Passenger and crew capacity of ship.
- Daily water use.
- Schematic of discharges.
- Description of discharges.
- Table containing estimated sample timing, type of discharge, type of sample (grab or composite), parameters (conventional or priority pollutants), and special circumstances.
- Equipment required.

Each sampling plan will be dated, and a copy will be provided to the Project Manager and the cruise ship companies. After the first sampling event on a vessel, the sampling plan may be updated. If it is updated, copies of the updated sampling plan will also be provided to the Project Manager and the cruise ship companies before the second round of sampling occurs.

The purpose of providing the sampling plans to the Project Manager and the cruise ship companies prior to sampling is to provide certainty that consistent sampling methods are followed and that samples are collected from appropriate and representative locations. Deviations from the sampling plan may well occur; these will be noted in the field notes.

Sampling plans, with dates and other schedule-specific information omitted, will be submitted to the cruise ship companies at least three working days before sampling. To avoid forewarning cruise ship companies of impending sampling, plans will normally be submitted in batches. The cruise ship companies will review the plans for accuracy and practicability and will make recommendations to the sampling team, which the sampling team will incorporate before sampling begins. Sampling will be conducted in general accordance with Tables 1, 2 and 3. Vessel-specific modifications to Tables 1 through 3 will be detailed in the vessel-specific sampling plans.

## CONVENTIONAL POLLUTANTS Sampling Configurations

| Sample Matrix | Location | Purpose | Sample Type | Parameters |
|---|---|---|---|---|
| Blackwater (1) | Sample Port in discharge line | Assess water quality. | Grab during final third of discharge, unless water has been collected while in port and settling/clarification may have occurred; then, composite in thirds during discharge dependent upon sampling manager's sample plan. Measure pH and chlorine residual at beginning and end of composite (two samples). Collect fecal sample at beginning and end (two samples). | Conventional Pollutants: TSS, BOD, Ammonia, Fecal Coliforms, pH, Chlorine Residual |
| **OR** (dependent upon vessel configuration) | | | | |
| Blackwater (2) | Sample Ports from each MSD cell | Assess water quality. | Lab composite for TSS, BOD, and ammonia. Grab from each cell for fecal coliform, pH, chlorine residual | |
| Graywater | Sample Port in discharge line or from tank discharge lines | Assess water quality. | Grab from each discharge point. | Conventional Pollutants: TSS, BOD, Ammonia, Fecal Coliforms, pH, Chlorine Residual, COD |
| Holding tanks for gray or black water (may be part of ballast system) | Sample Port in discharge line or from tank discharge lines | Assess water quality. | Grab during final third of discharge, unless water has been collected while in port and settling/clarification may have occurred; then, composite in thirds during discharge dependent upon sampling manager's sample plan. Measure pH and chlorine residual at beginning and end of composite (two samples). Collect fecal sample at beginning and end (two samples). | Conventional Pollutants: TSS, BOD, Ammonia, Fecal Coliforms, pH, Chlorine Residual, COD |

**TABLE 1**
**Sampling Configurations – Conventional Pollutants**

## PRIORITY POLLUTANTS Sampling Configurations

| Sample Matrix | Location | Purpose | Sample Type | Parameters |
|---|---|---|---|---|
| Blackwater (1) | Sample Port in discharge line | Assess water quality. | Grab during final third of discharge, unless water has been collected while in port and settling/clarification may have occurred; then, composite in individual sample bottles during discharge; grab or composite dependent upon sampling manager's sample plan. Sample VOCs at beginning and end of composite (two samples of three vials each). | Priority Pollutants: Pesticides, PCBs, BNA, VOCs, Metals, Cyanide |
| **OR** (dependent upon vessel configuration) | | | | |
| Blackwater (2) | Sample Ports from each MSD cell | Assess water quality. | Lab composite for pesticides, PCBs, BNA, metals, cyanide. Grab from each cell for VOCs. | |
| Graywater | Sample Port in discharge line or from tank discharge lines | Assess water quality. | Lab composite of graywater discharge sources: See ship-specific sampling plan. Sample VOCs from each discharge port. | Priority Pollutants: Pesticides, PCBs, BNA, VOCs, Metals, Cyanide |
| Holding tanks for gray or black water (may be part of ballast system) | Sample Port in discharge line or from tank discharge lines | Assess water quality. | Grab, unless water has been collected while in port and settling/clarification may have occurred; then, composite in thirds during discharge. Sample VOCs at beginning and end of composite (two samples of three vials each). | Priority Pollutants: Pesticides, BNA, VOCs, Metals, Cyanide |

**TABLE 2**
**Sampling Configurations – Priority Pollutants**

## B.2. *Sampling Methods Requirements*

### B.2.a. Sample Collection Procedures

To meet the requirements and intent of the May 25 *Cruise Ship Wastewater Monitoring Protocol for 2000 in Southeast Alaska*, sampling will normally be from a sample port in a discharge line, and will occur during discharge. Care will be taken to assure that samples are not collected immediately at the beginning or at the end of the discharge period, to assure sample representativeness and homogeneity. See individual sampling plans and Tables 1 through 3 for further detail on sample timing.

A volume of water equal to at least ten times the volume of the sample discharge line, will first be discharged into a bucket or similar container, to clear the line of standing water and possible contamination.

Samplers will wear disposable gloves and safety eyewear and will observe precautions while collecting samples, remaining aware of the potential biohazard present.

Samplers will take care not to touch the insides of bottles or lids/caps during sampling.

Samples will be listed as "composite" or "grab" on the Chain of Custody form. Details of composite components will be noted on the COC form and/or in field notes.

Bottles are pre-cleaned and do not require rinsing with sample. When sample bottles are pre-preserved, bottles must never be rinsed but will be filled only once with sample.

Samples will be cooled immediately in an ice-water bath to 4 C in accordance with B.3.b, below, and then placed into a cooler containing frozen blue ice to maintain a sample temperature of 2 to 4 ° C. Temperature will be measured and recorded at the time of sample collection and note will be made of the temperature of the cooler contents upon arrival at the laboratory.

**Grab Samples**

Sample bottles will be filled sequentially. Bottles will normally be filled to the shoulder of the bottle, leaving a small space for expansion and mixing. VOC bottles will be filled leaving a convex meniscus at the top of the bottle, with no air bubbles present; when the VOC lid is screwed on a small volume of water will be displaced and no air will be present in the bottle.

**Composite Samples**

Composite samples of different discharges of the same type will be composited by field sampling staff on board ship.

Composite samples over time from a single discharge may be composited in the field directly into the sample bottles, with composite portions estimated by field staff. The method of compositing, if performed, will be described in the individual ship sampling plans.

## B.2.b. Sample Containers, Preservations, Holding Times, Sample Types

| LAB PARAMETER | CONTAINER | PRESERVATION | HOLDING TIME | Grab or Composite | Sample Timing/ Collection |
|---|---|---|---|---|---|
| **Conventional Pollutants** | | | | | |
| Total Suspended Solids | From BOD bottle | 2-4° C | 7 days | Can composite if necessary | Dependent upon vessel (see individual vessel sampling plan) |
| Biochemical Oxygen Demand | 1 liter plastic cubitainer, white label | 2-4° C | 48 hours | Can composite if necessary | |
| Ammonia – Total | 250 ml HDPE, yellow label | $H_2SO_4$, pH <2, 4° C Lab pre-preserved | 28 days | Can composite if necessary | |
| Fecal Coliforms | 100 ml sterile plastic | Sodium Thiosulfate, 2-4° C | 6 hours | Grab Only | If TSS, BOD, and ammonia are composited, then sample at beginning and end of compositing period. |
| pH | 100 ml HDPE | N/A | ASAP in field | Grab Only | |
| Temperature | From pH Bottle | N/A | ASAP in field | Grab Only | |
| Chlorine Residual | From pH bottle | N/A | ASAP in field | Grab Only | |
| **Priority Pollutants** | | | | | |
| Pesticides | 1 liter glass | 2-4° C; Sodium Thiosulfate if residual chlorine is present. | 7 days until extraction | Can composite | Composite of all blackwater, and all graywater or ballast holding tank discharge (black and gray commingled). Refer to individual vessel sampling plan for timing. |
| PCBs | 1 liter glass | 2-4° C; Sodium Thiosulfate if residual chlorine is present. | 7 days until extraction | Can composite | |
| BNA | 1 liter glass | 2-4° C; Sodium Thiosulfate if residual chlorine is present. | 7 days until extraction | Can composite | |
| VOCs | 3 40-ml VOC vials | HCl, 2-4° C; Sodium Thiosulfate if residual chlorine is present; decant after sodium thiosulfate (see lab instructions). | 14 days until analysis | Grab Only | Grab sample at each discharge port (graywater, blackwater, ballast holding tank). |
| Metals | 500 ml HDPE | $HNO_3$, pH <2, 2-4° C | 28 days Hg/ 6 mo. Others | Can composite if necessary | Same as pesticides, PCBs, BNA. |
| Cyanide | 1 liter HDPE | NaOH, 2-4° C PH > 12 | 14 days | Can composite if necessary | |

**TABLE 3**
**Sample Containers, Preservations, Holding Times, Sample Types**

Samples will normally be pre-preserved by the laboratory. If a chlorine residual is detected during field measurement of chlorine, sodium thiosulfate provided by the lab will be added in the field to the BNA, PCB and pesticide sample bottles until no chlorine is detected. For VOCs, decanting bottles with sodium thiosulfate will be provided by the lab. When chlorine is detected, the sample will be added first to the decanting bottle, and then will be decanted into the VOC vials.

## B.3. *Sample Handling and Custody Requirements*

### B.3.a. Sample Custody

Samples and sample containers will be maintained in a secure environment, from the time the bottles leave the laboratory until the time the samples are received at the laboratory. The laboratories will maintain custody of bottles and samples using their normal custody procedures.

To maintain the secure environment for samples on board ship and during transport, samples must be 1) in the sampler's possession (line of sight), or 2) in a cooler sealed with signed and dated friable evidence tape on opposing sides of the cooler, or 3) in a locked cooler for which only the sampler has the key. When the cooler is sealed, the method of securing the samples must be such that tampering with samples or bottles is not possible: The cooler must secured so that the lid cannot be removed without breaking the evidence tape or cutting the lock, so that tampering would be clearly evident.

Transfer of samples will be accomplished using the laboratory's chain of custody form. When samples are transferred between personnel, such transfer will be indicated on the chain of custody form with signature, date and time of transfer. The chain of custody will remain with the samples, sealed inside the cooler, until receipt by the laboratory.

At any time during sample transfer, if custody is broken, note must be made on the chain of custody form accompanying the sample. Upon receipt at the laboratory, the laboratory sample custodian will make note if a breach of custody has occurred (for example, if a custody seal has broken during transport).

### B.3.b. Sample Temperature and Condition

Samples will be held at 2 - 4° C. A temperature blank will accompany all samples and will be measured at the laboratory upon receipt of the samples to verify the temperature. The temperature of this blank will be recorded on the chain of custody upon receipt of the sample at the lab.

To maintain the temperature, extra blue ice will be kept frozen on board ship. Blue ice will be exchanged just before shipment of samples to the lab, and may be exchanged more frequently during the sampling trip, as required.

Some samples may be at a temperature near body temperature (37 ° C) at time of sample collection. This temperature encourages growth of fecal coliform bacteria and thus these samples must be cooled as quickly as possible, without freezing them. These samples shall be placed in a water bath containing ice cubes provided on board ship. The bottles should be immersed in the water to the shoulder, rotated frequently, and ice should be added/water drained off as the ice melts for at least one hour until the sample reaches a temperature of 4 ° C. To ensure custody of these samples which may not be able to be sealed in the cooler until the temperature is lowered, these bottles can be sealed with custody tape individually, as necessary.

In no event will samples be placed in refrigerators meant for human food or beverages.

### B.3.c. Sample Holding Times

Sample holding times are as described in Table 3 above. Planned sample shipping schedules will allow for the meeting of these holding times.

The most critical holding time will be that of fecal coliforms, which is defined by EPA as 6 hours. To meet this holding time, a stringent scheduling effort will be required by the laboratory and sampling team. If the normal discharge pattern is altered in order to adhere to this holding time, note will be made of the change in the field notes and in the final quality control review.

Some fecal coliform samples may be analyzed by a subcontract laboratory in Ketchikan. The laboratory will adhere to Analytica's Quality Assurance Plan.

## B.4. *Analytical Methods and Quality Control Requirements*

A standard 30-day reporting turnaround time will be required.

The MDL referred to in Table 4 below is a statistically derived method detection limit, typically arrived at by repeat analyses performed by the laboratory, with a statistical EPA-defined calculation then performed (40 CFR 136 Appendix B). It is sometimes method-defined (as in, BOD). The reporting level is the level at which the laboratory QA department feels comfortable reporting data. Because the MDL is statistically derived, data can be detected at and near the MDL that are not accurate and that are frequently false positives. For this reason, many labs do not report at the MDL but report at some level, often approximately 3 times greater than the MDL (again, for statistical purposes). The MDLs and Reporting Limits are usually laboratory-specific standards and are not tied to compliance limits, and are not regulatory action levels. However, in some occasions with some method-defined reporting levels, the goal of the method has been to achieve a reporting level or MDL that provides for detecting analytes at regulatory limits.

Individual method detection limits, reporting limits (minimum levels), and precision and accuracy requirements are as follows:

**ANALYTICAL METHODS AND QUALITY CONTROL REQUIREMENTS**

| LAB PARAMETER | METHOD* | MDL (mg/l) | Reporting Level Minimum Level (mg/l) | PRECISION (RPD) | ACCURACY (% Recovery) |
|---|---|---|---|---|---|
| **Conventional Pollutants** | | | | | |
| Ammonia – Total | EPA 350.3 | 0.0043 | 0.05 | <20% | 85 - 115 % |
| Biochemical Oxygen Demand | EPA 405.1 | 2 | 2 | <20% | 80 - 120 % |
| Chemical Oxygen Demand | EPA 410.1 | 5.0 | 10 | <20% | 85 - 115 % |
| Chlorine Residual (field) | EPA 330.4 | 0.1 | 0.1 | N/A | N/A |
| pH | EPA 150.1 | 0.1 standard units | 0.1 standard units | <20% | N/A |
| Total Suspended Solids | EPA 160.2 | 0.2 | 4 | <20% | 85 - 115 % |
| Fecal Coliforms | SM 9221E | 1 FC/100 ml | 1 FC/100 ml | N/A | N/A |
| | | | | | |
| **Priority Pollutants** | | **mg/l** | **mg/l** | | |
| **Metals** | | | | | |
| Antimony | EPA 200.9 | 1.7 | 10 | <20% | 80-120% |
| Arsenic | EPA 200.9 | 0.76 | 2 | <20% | 80-120% |
| Beryllium | EPA 200.7 | 0.1 | 1 | <20% | 80-120% |
| Cadmium | EPA 200.9 | 0.062 | 0.2 | <20% | 80-120% |
| Chromium | EPA 200.9 | 0.15 | 1 | <20% | 80-120% |
| Copper | EPA 200.9 | 0.24 | 2 | <20% | 80-120% |
| Lead | EPA 200.9 | 0.28 | 1 | <20% | 80-120% |
| Mercury | EPA 245.1 | 0.048 | 0.2 | <20% | 80-120% |
| Nickel | EPA 200.7 | 4.0 | 40 | <20% | 80-120% |
| Selenium | EPA 200.9 | 0.38 | 3 | <20% | 80-120% |
| Silver | EPA 200.9 | 0.08 | 0.1 | <20% | 80-120% |
| Thallium | EPA 200.9 | 0.87 | 2 | <20% | 80-120% |
| | | | | | |
| | | | | | |
| **Cyanide** | EPA 335.4 | 1.5 | 5 | <20% | 80-120% |
| **Pesticides** | | | | | |
| Aldrin | 8081 A | 0.008 | 0.080 | <20% | 49-110% |
| Chlordane | 8081 A | 0.006 | 0.060 | <20% | 46-110% |
| Dieldrin | 8081 A | 0.010 | 0.080 | <20% | 41-148% |
| 4,4'-DDT | 8081 A | 0.010 | 0.200 | <20% | 24-155% |
| 4,4'-DDE | 8081 A | 0.007 | 0.050 | <20% | 40-110% |
| 4,4'-DDD | 8081 A | 0.010 | 0.060 | <20% | 34-144% |

*EPA methods in "Methods for Chemical Analysis of Water and Wastes," Environmental Protection Agency, Environmental Monitoring Systems Laboratory - Cincinnati (EMSL-CI), EPA-600/4-79-020, Revised March 1983 and 1979 where applicable.

*SM methods in "Standard Methods for the Analysis of Water and Wastewater," 18th Edition, APHA/AWWA/WEF.

*Four digit numeric methods are from *EPA Test Methods for Evaluating Solid Wastes. Physical/Chemical Methods (SW-846)*. 3rd Edition Update 2B, January 1995.

**TABLE 4 page 1**

**ANALYTICAL METHODS AND QUALITY CONTROL REQUIREMENTS**

| LAB PARAMETER | METHOD* | MDL (mg/l) | Reporting Level Minimum Level (mg/l) | PRECISION (RPD) | ACCURACY (% Recovery) |
|---|---|---|---|---|---|
| **Priority Pollutants (cont.)** | | | | | |
| **Pesticides (cont.)** | | | | | |
| Alpha Endosulfan | 8081 A | 0.007 | 0.080 | <20% | 26-152% |
| Beta Endosulfan | 8081 A | 0.009 | 0.050 | <20% | 28-145% |
| Endosulfan Sulfate | 8081 A | 0.009 | 1.75 | <20% | 13-149% |
| Endrin | 8081 A | 0.016 | 0.050 | <20% | 39-129% |
| Endrin Aldehyde | 8081 A | 0.034 | 0.100 | <20% | 19-156% |
| Heptachlor | 8081 A | 0.012 | 0.050 | <20% | 45-117% |
| Heptachlor Epoxide | 8081 A | 0.008 | 0.060 | <20% | 47-113% |
| Alpha BHC | 8081 A | 0.011 | 0.080 | <20% | 45-120% |
| Beta BHC | 8081 A | 0.010 | 0.16 | <20% | 26-125% |
| Gamma BHC | 8081 A | 0.008 | 0.050 | <20% | 41-110% |
| Delta BHC | 8081 A | 0.009 | 0.080 | <20% | 53-115% |
| Toxaphene | 8082 | 0.06 | 0.50 | <20% | 45-124% |
| PCB 1016 | 8082 | 0.03 | 0.10 | <20% | 58-124% |
| PCB 1221 | 8082 | | 0.20 | | |
| PCB 1232 | 8082 | | 0.10 | | |
| PCB 1242 | 8082 | | 0.10 | | |
| PCB 1248 | 8082 | | 0.10 | | |
| PCB 1254 | 8082 | | 0.10 | | |
| PCB 1260 | 8082 | 0.042 | 0.10 | <20% | 39-136% |
| **VOCs** | | | | | |
| Acrolein | 8260 B | 0.39 | 2 | <20% | 50-120% |
| Acrylonitrile | 8260 B | 0.33 | 10 | <20% | 60-140% |
| Benzene | 8260 B | 0.18 | 2 | <20% | 80-120% |
| Carbon Tetrachloride | 8260 B | 0.18 | 2 | <20% | 80-120% |
| Chlorobenzene | 8260 B | 0.11 | 2 | <20% | 80-120% |
| 1,2-Dichloroethane | 8260 B | 0.37 | 2 | <20% | 80-120% |
| 1,1,1-Trichloroethane | 8260 B | 0.23 | 2 | <20% | 80-120% |
| 1,1-Dichloroethane | 8260 B | 0.27 | 2 | <20% | 80-120% |
| 1,1,2-Trichloroethane | 8260 B | 0.44 | 2 | <20% | 80-120% |
| 1,1,2,2-Tetrachloroethane | 8260 B | 0.22 | 2 | <20% | 80-120% |
| Chloroethane | 8260 B | 0.36 | 5 | <20% | 62-133% |
| Chloroform | 8260 B | 0.25 | 2 | <20% | 80-120% |
| 1,1-Dichloroethylene | 8260 B | 0.35 | 2 | <20% | 74-140% |
| 1,2-TransDichloroethylene | 8260 B | 0.37 | 2 | <20% | 80-120% |
| 1,2-Dichloropropane | 8260 B | 0.35 | 2 | <20% | 80-120% |
| 1,2-Dichloropropylene | 8260 B | 0.35 | 2 | <20% | 80-120% |

*EPA methods in "Methods for Chemical Analysis of Water and Wastes," Environmental Protection Agency, Environmental Monitoring Systems Laboratory - Cincinnati (EMSL-CI), EPA-600/4-79-020, Revised March 1983 and 1979 where applicable.

*SM methods in "Standard Methods for the Analysis of Water and Wastewater," 18th Edition, APHA/AWWA/WEF.

*Four digit numeric methods are from *EPA Test Methods for Evaluating Solid Wastes. Physical/Chemical Methods (SW-846)*. 3rd Edition Update 2B, January 1995.

**TABLE 4 page 2**
**ANALYTICAL METHODS AND QUALITY CONTROL REQUIREMENTS**

| LAB PARAMETER | METHOD* | MDL (mg/l) | Reporting Level Minimum Level (mg/l) | PRECISION (RPD) | ACCURACY (% Recovery) |
|---|---|---|---|---|---|
| **Priority Pollutants (cont.)** | | | | | |
| **VOCs (cont.)** | | | | | |
| Ethylbenzene | 8260 B | 0.19 | 2 | <20% | 80-120% |
| Methylene Chloride | 8260 B | 1.2 | 5 | <20% | 60-140% |
| Methyl Chloride | 8260 B | 0.29 | 5 | <20% | 60-140% |
| Methyl Bromide | 8260 B | 0.76 | 5 | <20% | 51-131% |
| Bromoform | 8260 B | 0.32 | 2 | <20% | 80-120% |
| Bromodichloromethane | 8260 B | 0.34 | 2 | <20% | 80-120% |
| Dibromochloromethane | 8260 B | 0.32 | 2 | <20% | 80-120% |
| Tetrachloroethylene | 8260 B | 0.12 | 2 | <20% | 80-120% |
| Toluene | 8260 B | 0.25 | 2 | <20% | 80-120% |
| Trichloroethylene | 8260 B | 0.26 | 2 | <20% | 80-120% |
| Vinyl Chloride | 8260 B | 0.31 | 2 | <20% | 60-140% |
| 2-Chloroethyl Vinyl Ether | 8260 B | 0.24 | 10 | <20% | 60-140% |
| **BNA** | | | | | |
| Acenapthalene | 8270 | 0.46 | 5 | <40% | 48-133% |
| Benzidine | 8270 | 39.5 | 120 | <40% | 30-170% |
| 1,2,4-Trichlorobenzene | 8270 | 0.36 | 5 | <40% | 40-104% |
| Hexachlorobenzene | 8270 | 0.53 | 5 | <40% | 57-142% |
| Hexachloroethane | 8270 | 0.34 | 5 | <40% | 60-140% |
| Bis (2-chloroethyl) ether | 8270 | 0.56 | 5 | <40% | 40-121% |
| 2-Chloronapthalene | 8270 | 0.39 | 5 | <40% | 30-170% |
| 1,2-Dichlorobenzene | 8270 | 0.39 | 5 | <40% | 32-120% |
| 1,3-Dichlorobenzene | 8270 | 0.42 | 5 | <40% | 60-140% |
| 1,4-Dichlorobenzene | 8270 | 0.40 | 5 | <40% | 25-92% |
| 3,3'-Dichlorobenzidine | 8270 | 0.20 | 10 | <40% | 30-170% |
| 2,4-Dinitrotoluene | 8270 | 0.27 | 5 | <40% | 51-132% |
| 2,6-Dinitrotoluene | 8270 | 0.36 | 5 | <40% | 34-146% |
| 1,2-Diphenylhydrazine | 8270 | 0.45 | 5 | <40% | 60-140% |
| Fluoranthene | 8270 | 0.51 | 5 | <40% | 51-140% |
| 4-Chlorophenyl Phenyl ether | 8270 | 0.47 | 5 | <40% | 53-143% |
| 4-Bromophenyl Phenyl ether | 8270 | 0.39 | 5 | <40% | 53-138% |
| Bis (2-Chloroisopropyl) ether | 8270 | 0.59 | 5 | <40% | 60-140% |
| Bis (2-Chloroethoxy) methane | 8270 | 0.62 | 5 | <40% | 48-122% |
| Hexachlorobutadiene | 8270 | 0.40 | 5 | <40% | 60-140% |
| Hexachlorocyclopentadiene | 8270 | 19 | 60 | <40% | 30-170% |

*EPA methods in "Methods for Chemical Analysis of Water and Wastes," Environmental Protection Agency, Environmental Monitoring Systems Laboratory - Cincinnati (EMSL-CI), EPA-600/4-79-020, Revised March 1983 and 1979 where applicable.

*SM methods in "Standard Methods for the Analysis of Water and Wastewater," 18th Edition, APHA/AWWA/WEF.

*Four digit numeric methods are from *EPA Test Methods for Evaluating Solid Wastes. Physical/Chemical Methods (SW-846)*. 3rd Edition Update 2B, January 1995.

**TABLE 4 page 3**
**ANALYTICAL METHODS AND QUALITY CONTROL REQUIREMENTS**

| LAB PARAMETER | METHOD* | MDL (mg/l) | Reporting Level Minimum Level (mg/l) | PRECISION (RPD) | ACCURACY (% Recovery) |
|---|---|---|---|---|---|
| **Priority Pollutants (cont.)** | | | | | |
| **BNA (cont.)** | | | | | |
| Isopherone | 8270 | 0.57 | 5 | <40% | 46-118% |
| Napthalene | 8270 | 0.95 | 5 | <40% | 45-136% |
| Nitrobenzene | 8270 | 0.61 | 5 | <40% | 46-114% |
| N-Nitrosodimethylamine | 8270 | 0.62 | 5 | <40% | 30-170% |
| N-Nitrosodi-N-Propylamine | 8270 | 0.53 | 5 | <40% | 39-130% |
| N-Nitrosodiphenylamine | 8270 | 1.1 | 5 | <40% | 60-140% |
| Bis (2-Ethylhexyl) Phthalate | 8270 | 0.66 | 5 | <40% | 56-125% |
| Butyl Benzyl Phthalate | 8270 | 0.36 | 5 | <40% | 55-123% |
| Di-N-Butyl Phthalate | 8270 | 1.4 | 5 | <40% | 60-160% |
| Di-N-Octyl Phthalate | 8270 | 0.31 | 5 | <40% | 60-140% |
| Diethyl Phthalate | 8270 | 0.52 | 5 | <40% | 57-131% |
| Dimethyl Phthalate | 8270 | 0.48 | 5 | <40% | 61-123% |
| Benzo (A) Anthracene | 8270 | 0.39 | 5 | <40% | 58-118% |
| Benzo (A) Pyrene | 8270 | 0.39 | 5 | <40% | 40-138% |
| Benzo (B) Fluoranthene | 8270 | 0.40 | 5 | <40% | 41-133% |
| Benzo (K) Fluoranthene | 8270 | 0.40 | 5 | <40% | 60-160% |
| Chrysene | 8270 | 0.51 | 5 | <40% | 55-139% |
| Acenapthylene | 8270 | 0.40 | 5 | <40% | 48-133% |
| Anthracene | 8270 | 0.48 | 5 | <40% | 59-131% |
| Benzo (g,h,i) Perylene | 8270 | 0.85 | 5 | <40% | 50-125% |
| Fluorene | 8270 | 0.44 | 5 | <40% | 58-130% |
| Phenanthrene | 8270 | 0.52 | 5 | <40% | 54-140% |
| Dibenz (a,h) Anthracene | 8270 | 0.31 | 5 | <40% | 50-129% |
| Indeno (1,2,3-CD) Pyrene | 8270 | 0.30 | 5 | <40% | 48-125% |
| Pyrene | 8270 | 0.48 | 5 | <40% | 46-135% |
| 2,4,6-Trichlorophenol | 8270 | 0.37 | 5 | <40% | 56-129% |
| P-Chloro-M-Cresol | 8270 | 0.51 | 5 | <40% | 58-118% |
| 2-Chlorophenol | 8270 | 0.57 | 5 | <40% | 38-124% |
| 2,4-Dichlorophenol | 8270 | 0.50 | 5 | <40% | 55-130% |
| 2,4-Dimethylphenol | 8270 | 1.0 | 25 | <40% | 58-128% |
| 2-Nitrophenol | 8270 | 0.55 | 5 | <40% | 52-111% |
| 4-Nitrophenol | 8270 | 0.15 | 5 | <40% | 14-122% |
| 2,4-Dinitrophenol | 8270 | 9.55 | 29 | <40% | 53-109% |
| 4,6-Dinitro-O-Cresol | 8270 | 5.6 | 25 | <40% | 43-128% |
| Pentachlorophenol | 8270 | 0.16 | 5 | <40% | 37-112% |
| Phenol | 8270 | 0.25 | 5.0 | <40% | 27-101% |

*EPA methods in "Methods for Chemical Analysis of Water and Wastes," Environmental Protection Agency, Environmental Monitoring Systems Laboratory - Cincinnati (EMSL-CI), EPA-600/4-79-020, Revised March 1983 and 1979 where applicable.

*SM methods in "Standard Methods for the Analysis of Water and Wastewater," 18th Edition, APHA/AWWA/WEF.

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**TABLE 4 page 4**

**ANALYTICAL METHODS AND QUALITY CONTROL REQUIREMENTS**

## B.5. *Instrument/Equipment Testing, Inspection, and Maintenance Requirements; Calibration and Frequency*

Field instruments include a pH meter and chlorine residual color wheel test kit, and a thermometer.

Maintenance of the chlorine residual test kit includes keeping the sample cell rinsed after sample measurement, keeping the cell clean and free of fingerprints and oils, and keeping the color wheel itself clean. An extra cell will be kept with the test kit in case of breakage or scratches to the sample cell. Calibration of the test kit is not necessary.

Maintenance of the pH meter involves checking for low battery indicators, storing the pH probe in the appropriate solution (see manufacturer's instructions), and carrying a supply of extra batteries.

The calibration of the pH meter will be checked before and after each set of sample measurements. Acceptance criteria for the pH check are ± 0.1 pH units. A table as follows will be used to track pH checks in the field pH log:

| Date | Time | Sampler | Buffer 4.0 | Buffer 7.0 | Buffer 10.0 | Time of Final Check | Final Buffer 7.0 Check |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |

If after the pH check, a reading is greater than 0.1 from the buffer value, the meter will be recalibrated and the standards re-read. If after the final check of the 7.0 pH buffer, the reading is greater than 0.1 from the buffer value (< 6.9 or > 7.1), the meter will be recalibrated, the standards and samples re-read, and a final buffer check read again. Field pH readings will be read to one position after the decimal.

Temperature at or shortly after sample collection will be measured using either the temperature probe associated with the pH meter, or with an independent thermometer. The validity of the temperature probe will be checked early and late in the season against a certified thermometer at Analytica Laboratories; differences between the temperature probe and the certified thermometer will be documented in the final quality assurance review of the data.

Laboratory instrument and calibration procedures are detailed in the QA Plans from the Southeast Alaska and the Colorado Analytica Laboratories. Copies of these plans are available upon request from Analytica Labs or from the QA Officer.

## B.6. *Inspection/Acceptance Requirements for Supplies and Consumables*

Sample bottles will be visually inspected prior to sampling. If problems with bottles are noted, such as a cap that has fallen off an empty bottle, note of the problem will be made on the chain of custody form.

## B.7. *Inspection/Acceptance Requirements (Non-Direct Measurements)*

Historical data has not been used for this project so data acceptance criteria will not be required for historical data acceptance.

Data on board ship to be used includes tank volume and pumping rate data from ship tracking systems. The data will be used as reported by shipboard staff.

## B.8. *Data Management*

Data will be reported by the laboratory directly to Lt. Cmdr. Wood of the U.S. Coast Guard, Deena Henkins of ADEC, Steve Torok of the U.S. EPA, and the individual cruise lines. Vessels will be labeled on the reports using the blind vessel identifiers established by the Smith Bayliss LeResche sampling team. The report sent to the individual cruise line will also contain the name of the vessel (this is the report specified in A.9.d., after approval by the lab's QA manager).

The project manager and the laboratory manager will not be placed in the position of determining whether an analytical result represents a violation of federal and state regulations.

At the project manager's request, the lab will forward copies of data to the Quality Assurance Officer during the project. The Quality Assurance Officer will perform a review as requested to detect possible sampling or analysis difficulties before the project is completed.

This method of data management and dissemination is cumbersome but is the method preferred by project participants. Caution must be taken to assure that data is not widely used before a thorough review has been made by both the Quality Assurance Officer and project participants. With many participants receiving data simultaneously, the risk of misinterpretation is high.

The Quality Assurance Officer will perform a final review of all data and will assemble a tabular report with data verification and validation comments. This report will be issued directly to the Project Manager, who will disseminate to the appropriate parties.

# C. ASSESSMENT/OVERSIGHT

## C.1. *Assessments and Response Actions*

### C.1.a. Field Assessments

As noted in Section D, copies of field notes will be forwarded to the Quality Assurance Officer after the first two weeks of sampling in order to review for possible gaps or problems. No field audits are planned as part of this sampling project.

### C.1.b. Laboratory Assessments

Laboratories are subject to periodic and extensive audits by regulatory agency personnel as part of their certification. No laboratory audits by project personnel are planned as part of this sampling project.

### C.1.c. Corrective Action

If errors in sampling or analysis are noted by the laboratory, sampling personnel, or Quality Assurance Officer, the Quality Assurance Officer will be notified via email. The QA Officer will notify the Project Manager and the party responsible for the error of the deficiency, and will recommend methods of correcting the deficiency. The responsible party will then be responsible for correcting the problem and will report corrections via email to the QA Officer and the Project Manager.

## C.2. *Reports to Management*

The Project Manager issues a weekly email report of project activities to project participants. Activities and/or difficulties during the sampling and analysis process will be reported to the Project Manager. The Project Manager will forward communications to project participants and Cruise Line Agencies.

# D. DATA VALIDATION AND USABILITY

## D.1. *Data Review, Verification, and Validation*

During the project, the Quality Assurance Officer will perform occasional checks as requested by the Project Manager, of field notes and data packages to detect correctable problems for the remainder of the study. Any problems noted will be immediately brought to the attention of the Project Manager.

Upon completion of the sampling program, the Quality Assurance Officer will review all data and field notes to verify that the Quality Assurance Project Plan was followed. Items reviewed will include:

- Comparison of dated sampling plans with QAPP to assure that correct samples were planned.
- Comparison of dated sampling plans with field notes and custody forms to assure that planned samples were collected.

- Review of field notes and data to assure that information specified in QAPP was collected.
- Review of field pH calibration log to assure that correct field calibration procedures were used.
- Review of custody forms: Check for breaches of custody, that temperature was measured upon receipt at lab, that temperature was within specified range, check for anomalies notes on custody form.
- Review of laboratory data packages:
  - Were correct methods used?
  - Were holding times met?
  - Were accuracy and precision within data quality objectives?
  - Were reporting limits correct?
  - Were lab qualifiers provided if there was an anomaly in the lab?
- Was the data package as a whole for each event complete?

A report in table format will be produced at the end of the project with the results of this verification analysis. Narrative qualifiers will be included in the validation report; numerical information will be included where appropriate (e.g., "The completeness measure for this sampling event is 75% due to a vial breaking in shipment.")

## E. BIBLIOGRAPHY

Documents referenced during the preparation of this document include:

1. May 25 *Cruise Ship Wastewater Protocol for 2000 in Southeast Alaska*, Alaska Cruise Ship Initiative.
2. DRAFT, May 10, 2000, Alaska Cruise Ship Initiative: *Report of the Work Groups*.
3. *EPA Guidance for Quality Assurance Project Plans*, EPA QA/G-5, EPA /600/R-98/018, February 1998.
4. Code of Federal Regulations.
5. *Water Quality Standards Handbook, Second Edition*, EPA-823-B-94-005a, August 1994.
6. *Compilation of the U.S. Environmental Protection Agency's Water Quality Criteria for the Priority Toxic Pollutants*, ADEC, September 1997.